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(54) **Adjusting curvature of formwork**

(57) Formwork 10 comprises U-shaped members 12, the legs 22 of which are secured to panels 26, the base 20 of each member carrying a soldier 14. The members 12 are arranged in columns, the soldiers 14 of these columns being

connected by turnbuckles 30 to alter the distance between the soldiers 14 and consequently alter the curvature of the panels 26.

The soldiers 14 evenly distribute loads generated by the pressure of concrete acting on the panels 26 and passed through the ties 28 and U-shaped members 12.

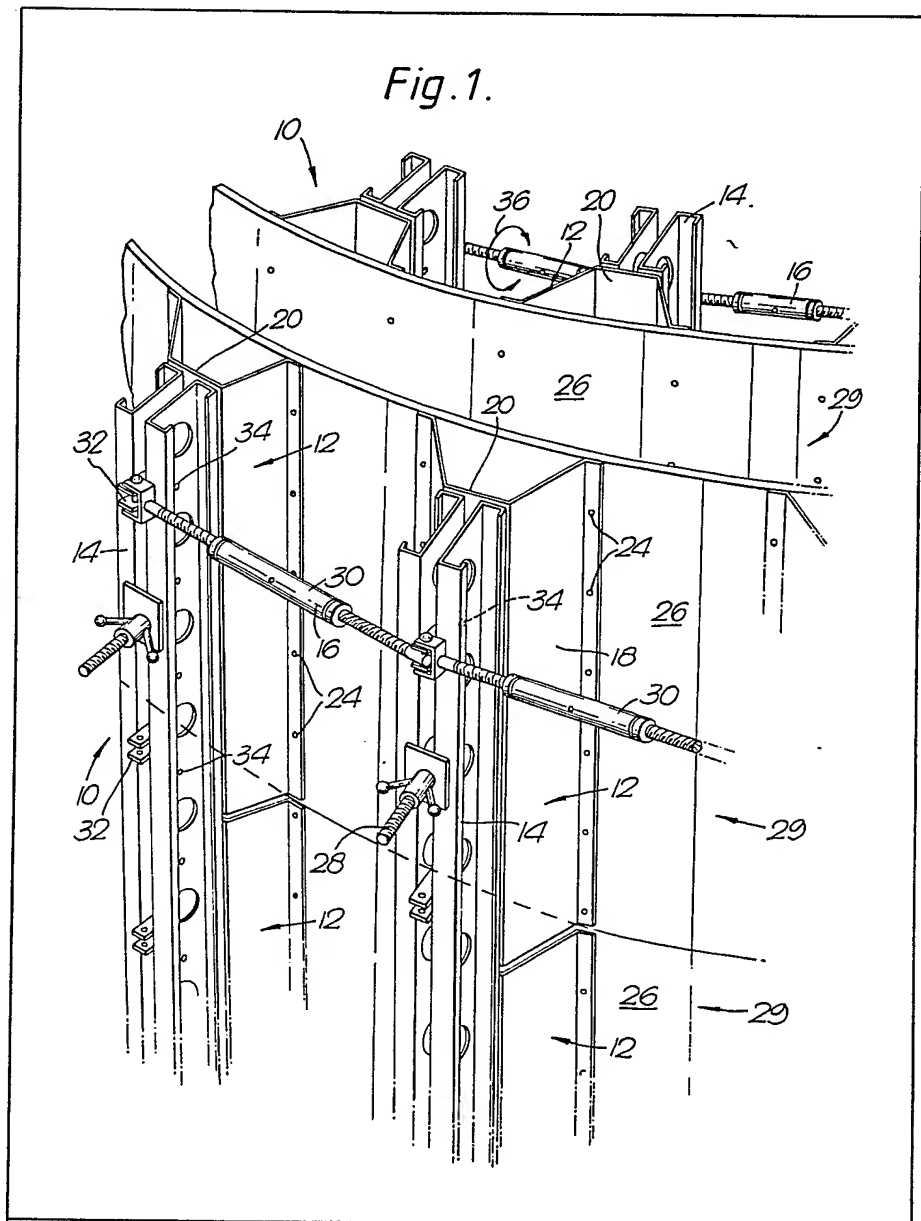


Fig. 1.

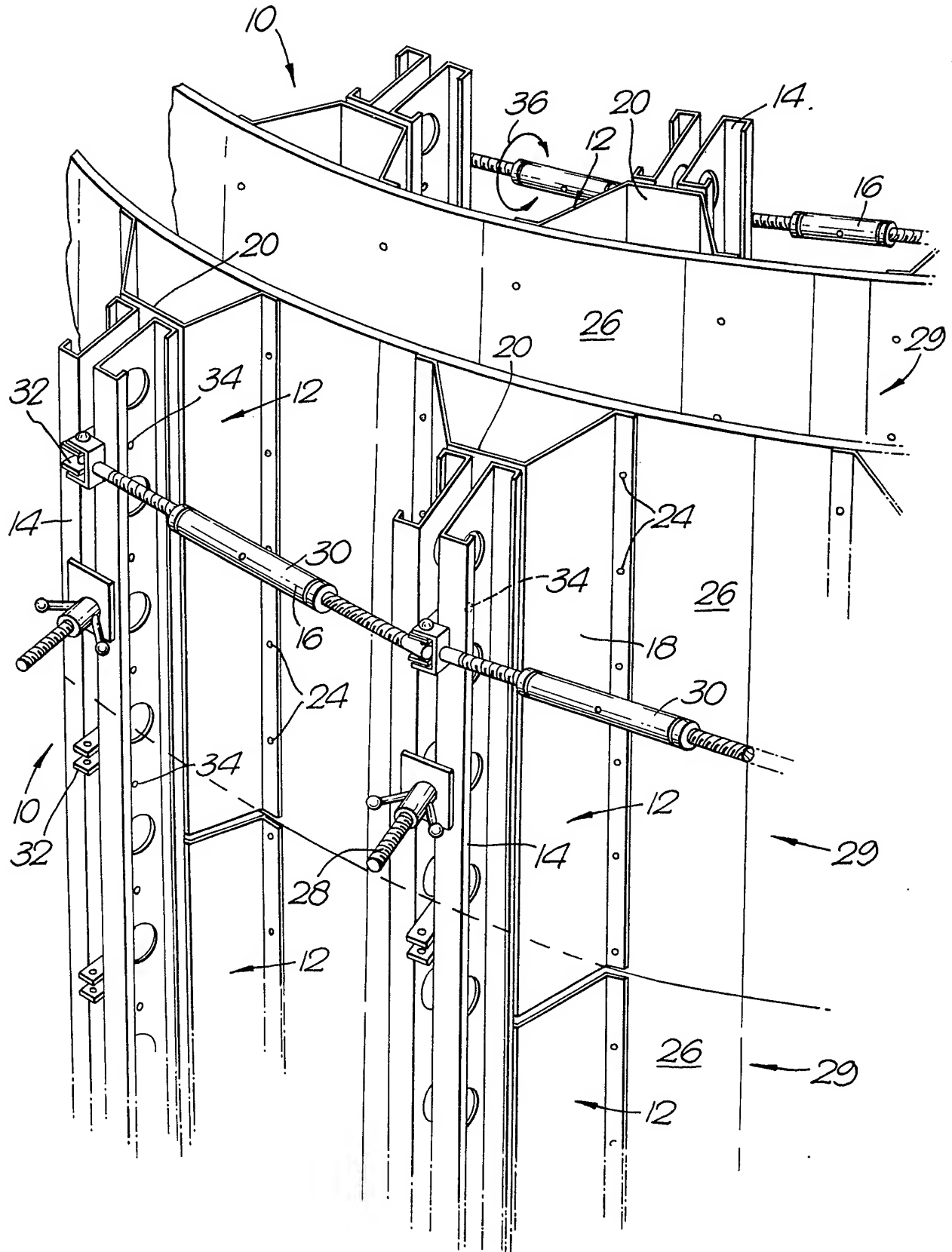


Fig. 2.

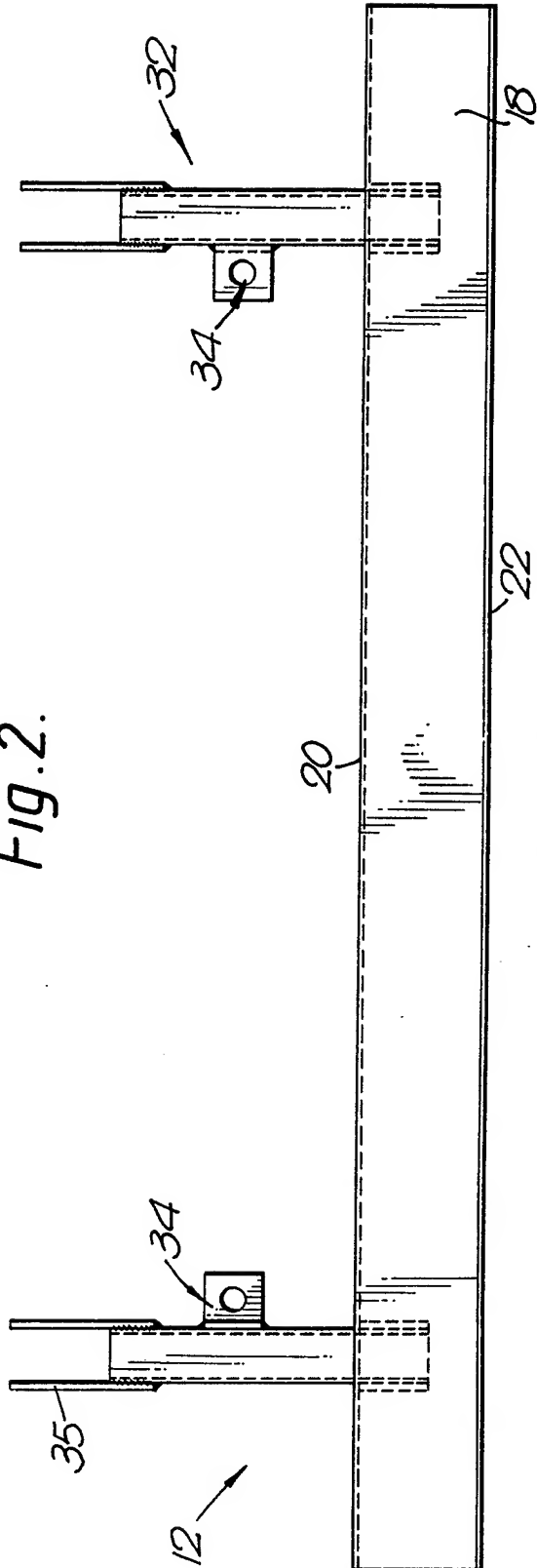
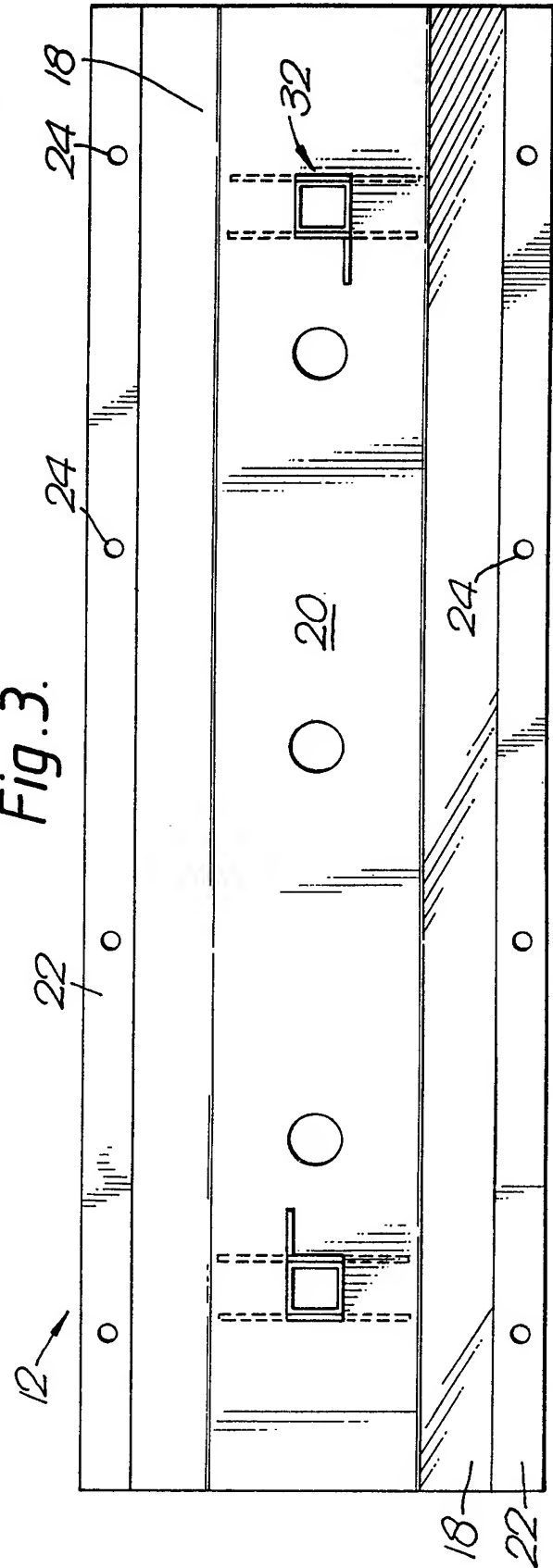


Fig. 3.



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Fig. 4.

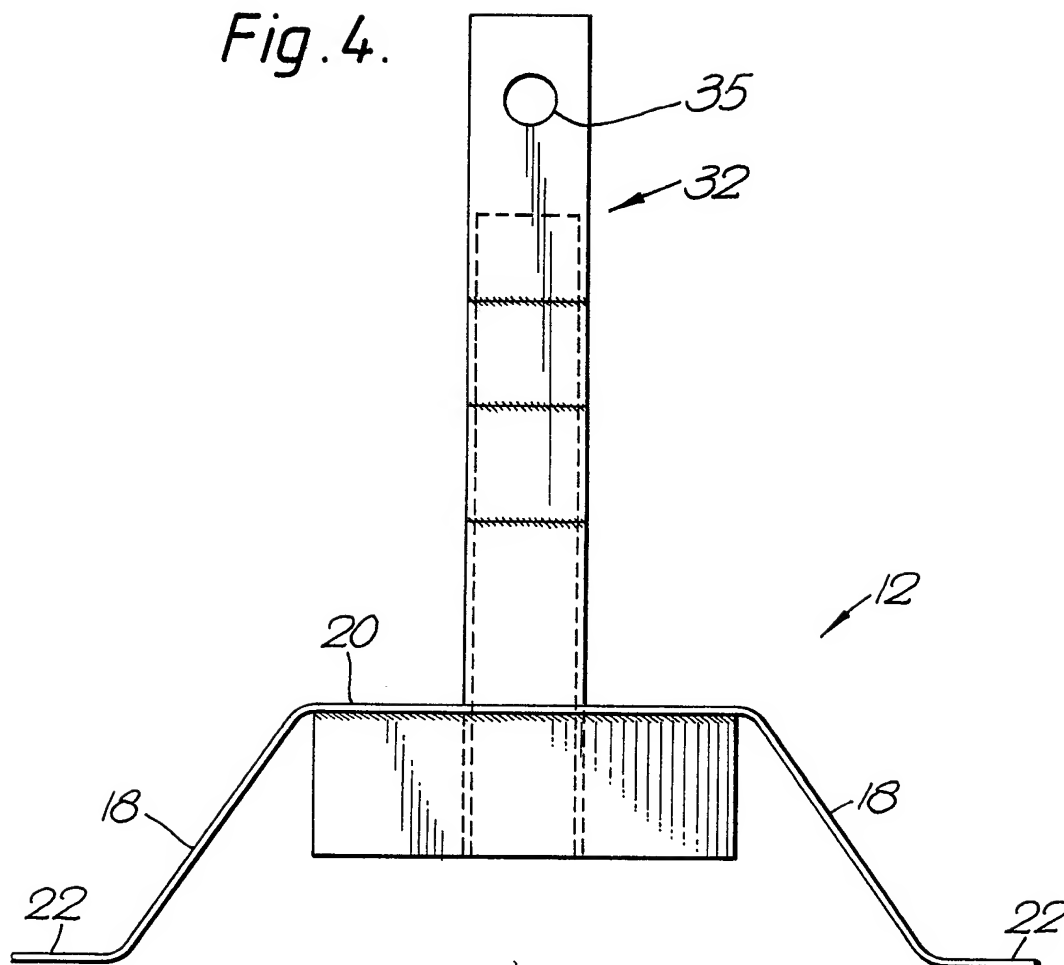


Fig. 5.

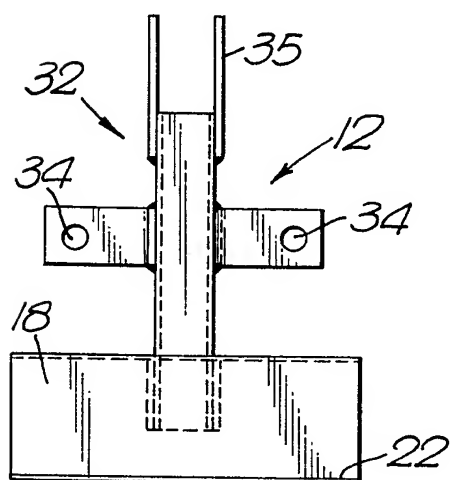
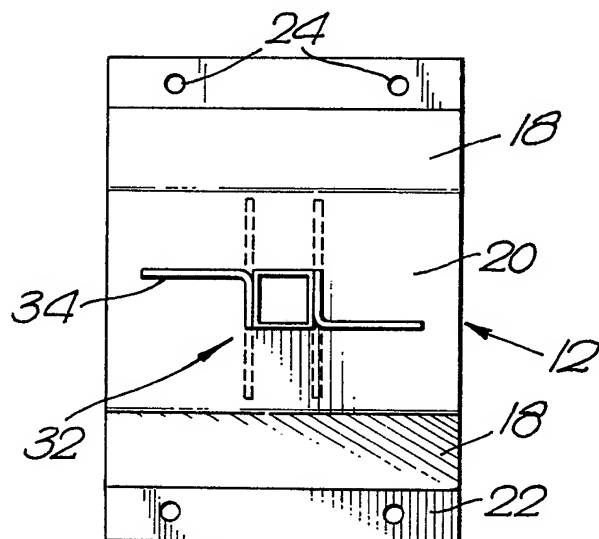
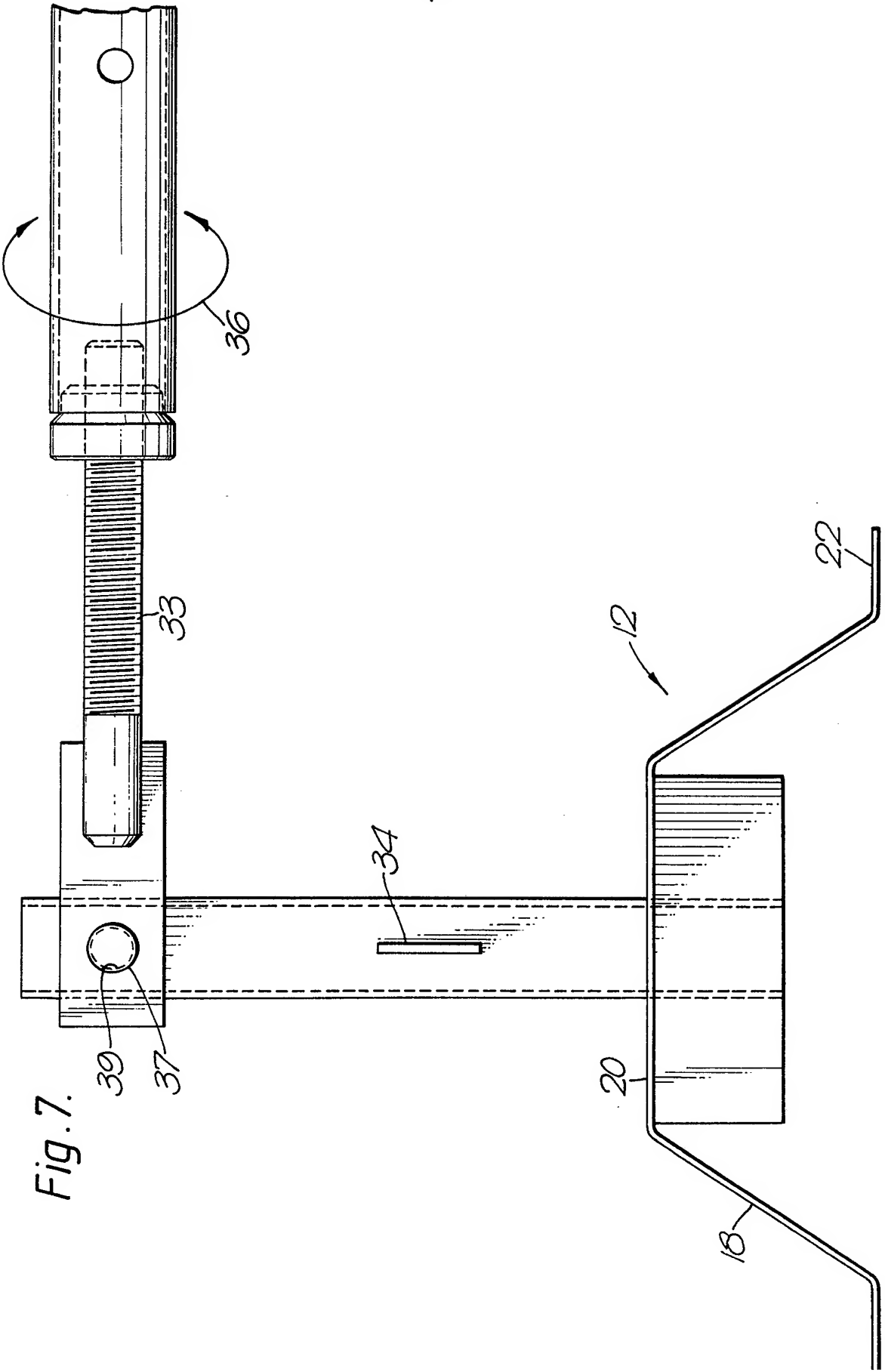


Fig. 6.





SPECIFICATION Formwork

This invention relates to concrete formwork. It is particularly concerned with formwork to produce curved walls, the curvature of which may be altered by altering the radius of curvature of the formwork panels.

One type of adjustable formwork to produce curved walls is disclosed in German Patent No. 2426708 in which beams of U-shaped cross-section have legs which are secured to panel sections the distance between the legs being adjustable to obtain curved panelling.

In this arrangement however, as beams of standard lengths are used to support the vertical panelling, only walls the height of standard lengths of beams can be formed. Furthermore the beams poorly distribute the tie loads generated by the pressure of concrete between the formwork.

It is an object of the invention to overcome or mitigate one or more of the above problems.

Concrete formwork in accordance with the invention comprises a deformable panel and at least two parallel spaced U-shaped members having their legs secured to one face of the panel the base of each member carrying a soldier, the outer face of the two soldiers being connected by an adjustable tie so that alteration of the distance between the soldiers alters the curvature of the panel.

Preferably a plurality of U-shaped members are secured to the panel(s) in at least two columns, a soldier being supported on and spanning over two or more support members in the same column to act as a continuity member. The height of a formwork structure can thus be easily varied using the same basic formwork by altering the number of U-shaped members in each column and using different lengths of soldier and using either panels of different heights or a number of separate panels.

The arrangement is advantageous in that in use the soldiers provide rigidity as well as evenly distributing loads generated by the pressure of concrete acting on the panel(s) and passed through the ties and U-shaped members.

Preferably the adjustable tie comprises a turnbuckle attached at either end to a support post securely fixed to the base flange of the U-shaped member. The soldiers are preferably open-webbed such that the support post passes through the web of the soldier and is fixed therein.

Preferably the length of a U-shaped member corresponds substantially to the width of standard panel(s) used. Furthermore the length of the soldier used corresponds substantially to the height of concrete wall to be cast.

The invention will now be described, by way of example, with reference to the accompanying drawings, in which:—

Figure 1 is a perspective view of formwork in accordance with the invention;

Figure 2 is a side view of part of the formwork shown in Figure 1,

Figure 3 is a plan view of the part of Figure 2, Figure 4 is an end view of an embodiment of a part of the formwork in accordance with the invention.

Figure 5 is a side view of the part of Figure 4, Figure 6 is a plan view of the part of Figure 4, and

Figure 7 is an end view of a further embodiment of a part of the formwork in accordance with the invention.

Concrete formwork 10 shown in Figure 1 comprises a plurality of U-shaped members 12, soldiers 14, adjustable tie means 16 and panelling 26.

The members 12 basically comprise two inclined legs 18 joined together by a base flange 20. The members are firmly secured to the formwork panelling 26 (e.g. plywood sheets) through a number of holes 24 in end flanges 22.

The soldiers 14 are open-webbed and have a structure similar to any of the soldiers described in G.B. Patent No. 1591300 (the subject matter of which is hereby incorporated). The soldiers 14 when in use rest on the base flange 20 of the member 12 and act as backing members for ties 28 that pass through formwork 10 on each side of the panelling 26 to better distribute loads on the ties 28 and members 12 generated by the pressure of the concrete in pours between the sheeting 26.

The adjustable tie means 16 which provide the curvature of the panelling 26 comprise a turnbuckle 30 (or 33 — see Figure 7) attached at each end to a support post 32 which is secured to the base flange 20 of the member 12.

Each end of the turnbuckle 30 or 33 may be either attached to and within a U-shaped section 35 welded to the upper end of the support post 32 (see Figures 1 to 6) or alternatively attached by a nut and bolt passing through both a hole 37 in the flange end of the turnbuckle 33 and a hole 39 in the relatively extended support post 32.

The posts 32 extend between the webs of the soldiers 14 and are also securely pinned to the soldiers at points 34. The pinning of the posts 32 to the soldiers 14 also secures the soldiers 14 relative to the member 12. To vary the curvature of the panelling 26, the turnbuckles 30 or 33 extending between two adjacent soldiers are simply rotated in one direction to increase the curvature, and rotated in the opposite direction to decrease the curvature (see arrow 36).

As shown in Figure 1, the U-shaped members 12 are arranged in a number of columns, each column having two or more members. One U-shaped member of two or more adjacent columns are secured to a panel of sheeting 26 to form a U-shaped member and panel unit 29. A soldier 14 passes over all the support members 12 in each column so as to act as a continuity member for the shorter length support members 12 and panels of sheeting 26. To vary the height of the formwork and accordingly, the wall being cast, the number of units 29 used are altered and different length of soldiers are used.

Support members 12 are used which are alternatively either equal in length to the width of a standard panel 26 (for example 1.2 m long in Figures 1, 2 and 3), or of length such that a unit
 5 always straddles the joint between consecutive plywood panels in order to overcome small dimensional discrepancies and prevent "stepping" at these joints (e.g. 0.9 m long), or are of shorter length (for example 0.3 m — see Figures 5 and 6).
 10 The formwork 10 is particularly useful for the building of curves in any type of building structure for example underpasses for pedestrians, sewage filtration tanks, silos and curved walls. Any reasonable height or length of curved building
 15 structure can be cast using the formwork 10. However, it is particularly preferable for a height or length of curved wall in the range of 15 to 20 metres.

CLAIMS

20 1. Concrete formwork comprising a deformable panel and at least two parallel spaced U-shaped members having their legs secured to one face of the panel and the base of each member carrying a soldier, the outer face of the two adjacent soldiers
 25 being connected by an adjustable tie so that alteration of the distance between the soldiers

alters the curvature of the panel.

2. Concrete formwork as claimed in Claim 1 wherein a plurality of U-shaped members are
 30 secured to the panel(s) in at least two columns, a soldier being supported on and spanning over two or more support members in the same column to act as a continuity member.

3. Concrete formwork as claimed in either
 35 Claim 1 or 2 wherein the adjustable tie comprises a turnbuckle attached at either end to a support post securely fixed to the base flange of the U-shaped member.

4. Concrete formwork as claimed in Claim 3
 40 wherein the soldiers are open-webbed such that the support post passes through the web of the soldier and is fixed therein.

5. Concrete formwork as claimed in any preceding Claim wherein the length of a U-shaped
 45 member corresponds substantially to the width of standard panel(s) used.

6. Concrete formwork as claimed in any preceding Claim wherein the length of the soldier
 50 used corresponds substantially to the height of concrete wall to be cast.

7. Concrete formwork substantially as described herein with reference to the accompanying drawings.

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ABSTRACT:

Formwork 10 comprises U-shaped members 12, the legs 22 of which are secured to panels 26, the base 20 of each member carrying a soldier 14. The members 12 are arranged in columns, the soldiers 14 of these columns being connected by turnbuckles 30 to alter the distance between the soldiers 14 and consequently alter the curvature of the panels 26.

The soldiers 14 evenly distribute loads generated by the pressure of concrete acting on the panels 26 and passed

through the ties 28 and U- shaped members 12. 